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Before the
FEDERAL COMMUNICATIONS COMMISSION
Washington, DC 20554

In the Matter of		
Amendment of the Commission's Rules to Establish a Single AM Radio Stereophonic Transmitting Equipment Standard	}	ET Docket No. 92-298

COMMENTS OF MOTOROLA INC.

Respectfully submitted by:

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EXECUTIVE SUMMARY

Motorola strongly supports the proposal, in the instant rulemaking, to adopt the C-Quam system as the United States standard for stereophonic AM broadcast radio service. The proposed action is consistent with the expressed legislative intent to advance AM stereo service. The lack of an official U. S. broadcast standard for AM stereo has apparently retarded the availability of AM stereo non-auto receivers in this country. Adoption of the C-Quam standard will benefit AM service listeners by encouraging the availability of more AM stereo receivers and transmitting facilities, thereby providing the American public with higher quality AM broadcasts.[1]

Motorola fully supports the Commission's proposed technology licensing policy. We have consistently licensed the C-Quam technology on highly reasonable terms. This record is well documented. We pledge to continue to do so.

Motorola supports the Commission's proposed timetable for transition to C-Quam.

Finally, on the technical side, Motorola supports the proposal to standardize the level of pre-emphasis utilized by AM broadcast stations.

BACKGROUND DISCUSSION

Motorola is pleased to offer its comments on a number of the issues raised in the Commission's Notice of Proposed Rule Making (NPRM), which proposes to adopt C-Quam as the U. S. standard for AM stereo broadcasts. As the inventor and developer of the C-Quam system, Motorola has been a major proponent of, participant in and

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[1] Attached to these comments are certain "Editorial Corrections" to the rules as proposed in the NPRM. These suggested corrections, while significant in terms of technical accuracy, do not affect the substantive nature of the Commission's proposed action in this proceeding.

contributor to AM stereo since the mid-seventies. Through the years, C-Quam has become the medium wave stereophonic broadcasting system of choice in those countries of the world that have adopted a standard. It has also been widely recognized as the *de-facto* standard of the United States.

C-Quam could not have gained its dominant world position without its robust performance merits. Presently, C-Quam is being utilized on over one hundred different models of transmitters, is employed at nearly one thousand transmitting stations worldwide, some 700 of which are in the U.S.[2] Also, approximately twenty-five to thirty million receivers incorporate C-Quam AM stereo. C-Quam is a proven system that has stood the test of time for over 10 years.

I. ADOPTION OF THE C-QUAM STANDARD IS CONSISTENT WITH THE EXPRESSED LEGISLATIVE INTENT TO ADVANCE AM STEREO SERVICE.

The NPRM notes the legislative intent, as expressed in the Telecommunications Authorization Act of 1992 (Authorization Act),[3] "...to advance AM stereo service."[4] Further, the NPRM places heavy reliance on the impact which the C-Quam standard would have on the number and availability of receivers incorporating AM stereo. Motorola concurs with the significance of this emphasis. Present C-Quam AM stereo stations have the potential to reach over 95 per cent of the United States population.

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[2] The estimated U.S. number includes about thirty Harris C-Quam compatible signal systems and also about thirty-six that are "in process".

[3] See Telecommunications Authorization Act of 1992, Pub. L. No. 102-538.

[4] See "Notice of Proposed Rule Making," ET Docket No. 92-298, at par. 6.

The coverage map, found in the Appendix, illustrates this point.[5] However, in the absence of an official standard, receiver manufacturers have not made AM stereo receivers broadly available. The attached Appendix to these Comments illustrates the growth trends of the various facets of C-Quam.

II. THE C-QUAM STANDARD WILL HAVE A BENEFICIAL IMPACT ON LISTENERS TO AM STEREO.

Adoption of the proposed standard is anticipated to offer a beneficial increase in the availability of AM stereo receiver products for use by potential AM stereo listeners. Currently, the stereo receiver population growth rate in the United States may have been slowed by marketplace considerations, significantly including the lack of a standard in this country. While there has been a reasonable and healthy rate of penetration among both broadcasters and domestic manufacturers of auto radios, the situation has been dramatically different in the case of suppliers of non-auto receiver products. These suppliers have virtually ignored the AM stereo market. Among the reasons offered for such non-participation have been lack of a standard, extra cost, and lack of customer demand.

The cost consideration has been significantly reduced by integrated circuit manufacturers, which have succeeded in driving down the cost of the AM stereo decoding function. Consumer awareness has also increased significantly, due to the slow but steady growth of AM stereo broadcast stations.

The third remaining negative incentive, the lack of an official U. S. standard, has been addressed most effectively by the Commission's NPRM. Despite the

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[5] It should be noted that the referenced map, while demonstrating the very high percentage of coverage, is over four years old and does not reflect the even greater increases which have taken place since 1988 in the C-Quam service coverage area.

predominance of C-Quam as the system of choice by those stations broadcasting AM stereo, many broadcasters have held back from converting to AM stereo because in the U. S. there are insufficient non-auto receivers available to warrant the investment.

To date, there has been almost no AM stereo penetration in non-auto radio receiver products into the U. S. market. This fact carries enormous significance in terms of the number of individuals who could potentially enjoy and benefit from AM stereo service: the non-auto radio receiver market is approximately twice the size of the auto receiver market. The AM stereo penetration of these radios, such as the personal portables, portables, boom boxes, table models, component modular systems, etc., is almost negligible.

The difference in response between auto and non-auto receiver products relates to a marketplace difference. In the case of auto receiver products for AM stereo, the manufacturers are domestic and are intimately familiar with the strong acceptance among the U. S. public of AM stereo. Non-auto receiver products, on the other hand, are manufactured predominantly by non-domestic companies. These products are low profit margin consumer items. Economically, it is most desirable that technology reuse be as high as possible in low margin global products such as AM radio receivers. The possibility for such technology reuse in the U. S. market has appeared uncertain, because there is no official U. S. AM stereo standard adopted in this country. Manufacturers of the potentially broad array of non-auto radio products have largely refrained from participating in the enormous U. S. AM stereo market — to the detriment of AM stereo listeners.

The negative effects of this reluctance to invest are circular: as stated above, some AM broadcasters are reluctant to invest in AM stereo transmitting equipment until there are greater numbers of listeners with the capability to receive AM stereo.

The lack of a standard has therefore contributed to the lack of availability of AM stereo service in this country, from both the listener's standpoint and that of the service provider who invests in the transmitting infrastructure.[6]

III. MOTOROLA WILL FULLY CONFORM TO THE PROPOSED REQUIREMENTS FOR LICENSING OF AM STEREO PATENTS TO OTHER PARTIES UNDER FAIR AND REASONABLE TERMS.

The NPRM appropriately proposes to require that the selection of the C-Quam system standard be conditioned upon the policy that Motorola will license its patents to other parties under "fair and reasonable terms."[7]

Motorola fully supports this proposal. Throughout its years as the developer and proponent of C-Quam, we have established a liberal and well-documented policy of licensing C-Quam technology. In fact, we have twice extended offers for free licensing to manufacturers of broadcast equipment in order to facilitate the acceptance and implementation of AM stereo among the user public. Subsequent to these free licensing periods, licensing has continued to be open, liberal, and reasonable. Examples of companies which have participated in such licensing arrangements include Delta Electronics of Alexandria, Virginia; Broadcast Electronics of Quincy, Illinois; TFT Corporation of Santa Clara, California; Belar, Inc., of Devon, Pennsylvania; and Harris Broadcast Products of Quincy, Illinois.

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[6] The legislative intent to advance AM stereo could also be undermined by the re-opening of a long, expensive and arduous standards process. The NPRM appropriately sets specific, expedited dates for the standard to be adopted.

[7] See NPRM, par. 7.

Motorola has also pursued a liberal licensing policy (and will continue to do so) with regard to its C-Quam receiver design technology. Many dozens of manufacturers have been licensed at an extremely modest fee.[8]

IV. THE PROPOSED TRANSITION PERIOD OF ONE YEAR IS QUITE REASONABLE.

Motorola supports the Commission's proposal to allow a reasonable period within which to discontinue the use of any alternative AM stereo systems which may currently be in use. The experience in Canada may be relevant. In that country, where C-Quam was also adopted as the standard, most stations converted within the first 3 to 6 months with only a few stations waiting until the end of the transition period.

The Commission's proposed transition period should be sufficient to allow any affected broadcasters adequate time to plan efficiently for the conversion in accordance with their individual financial circumstances. The transition period will also allow manufacturers of C-Quam broadcast equipment and consultants a reasonable time to schedule conversions of any imbedded non-C-Quam systems.

The NPRM further requests comment on the extent to which the Harris AM stereo system may be compatible with C-Quam and whether Harris systems should be permitted to continue in operations. Motorola offers the following observations as to events already taking place within the marketplace.

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[8] In cases where manufacturers have desired to use not only the C-Quam technology but also the "C-Quam" name, Motorola has required minimum performance standards to be met. These requirements have been eminently reasonable and have not proven to be a barrier. To emphasize, the requirements have related only to the use of the term "C-Quam" and do not apply to the licensing of the technology itself, which remains fully available under very liberal terms.

It is technically possible to modify the Harris AM stereo system to be compatible with C-Quam. The modification procedure for the Harris reduced angle Quam system (Model STX-1 and STX-1A) is relatively simple. While such a modification would make the Harris system reasonably compatible with C- Quam, time and experience have shown us that the station's performance is further improved by making the full conversion to C-Ouam. In such cases. Harris has made the

which in effect adopts the present ANSI/EIA-549-1988 standard.[11] The same standard is presently used in Canada and is also proposed for standardization in Japan by the respective governmental agency. The experience in Japan shows that standardization of pre-emphasis allows the design of wider bandwidth receivers without fear of customer confusion or dissatisfaction which might otherwise result from widely varying high frequency response.

In the United States, pre-emphasis standards have in the past been voluntary, with the encouragement of presumptive compliance. The proposed standard will contribute to the overall efforts to improve AM stereo by the FCC, the NRSC committee, and the AMAX campaign committees.

Finally, Motorola makes the following recommendation on another technical issue. The Commission's current rules for FM stereo establish a region within allocated FM spectrum for pilot tone protection. Motorola suggests that similar protection should be provided in the case of AM stereo. The protected area should be 25 Hz +/- 5 Hz.

CONCLUSIONS

Motorola supports the Commission's proposal to adopt C-Quam as the U. S. standard for AM stereo broadcasting. Such action, when coupled with similar standards adoption in other countries (notably, Japan, Australia, Canada, Mexico, Brazil, and South Africa) should accelerate the availability of AM stereo radios to U. S. listeners.

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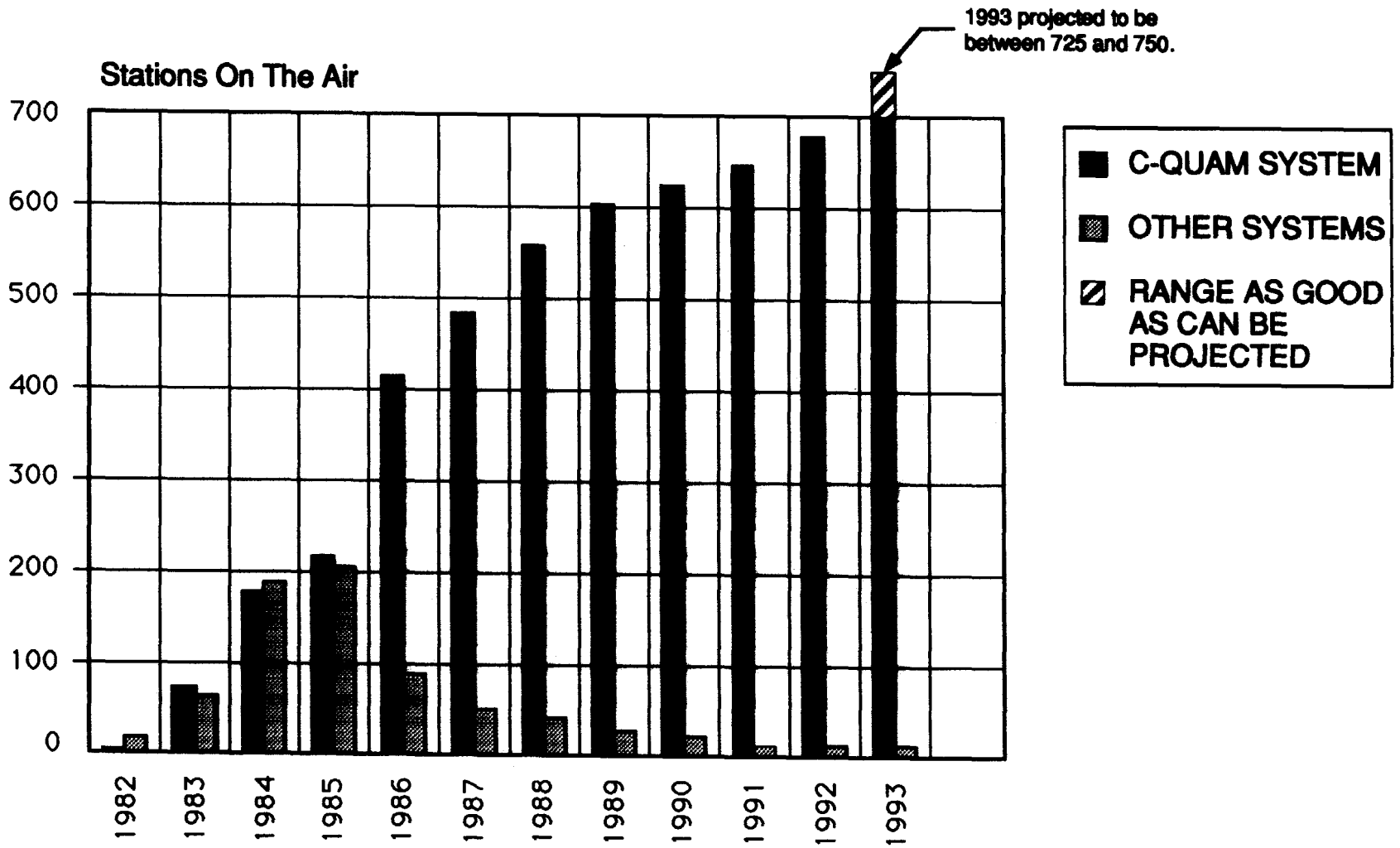
[11] Motorola served on the committee which proposed and selected the modified 75 uS pre-emphasis curve.

The NPRM's proposed action takes place within the context of the marketplace, which has converged on a single system, C-Quam. The adoption of the standard offers the prospect of accelerating stereo growth for AM radio. This beneficial development is fully consistent with the legislative intent to advance AM stereo service to the public. The Commission's action will send an encouraging signal to AM receiver manufacturers which should result in an increased number of non-auto radio products available to AM stereo listeners. This growth in AM stereo receiver availability should also encourage additional investment in AM stereo infrastructure equipment by U. S. broadcasters. The overall result should be increased availability of AM stereo to the American public.

APPENDIX

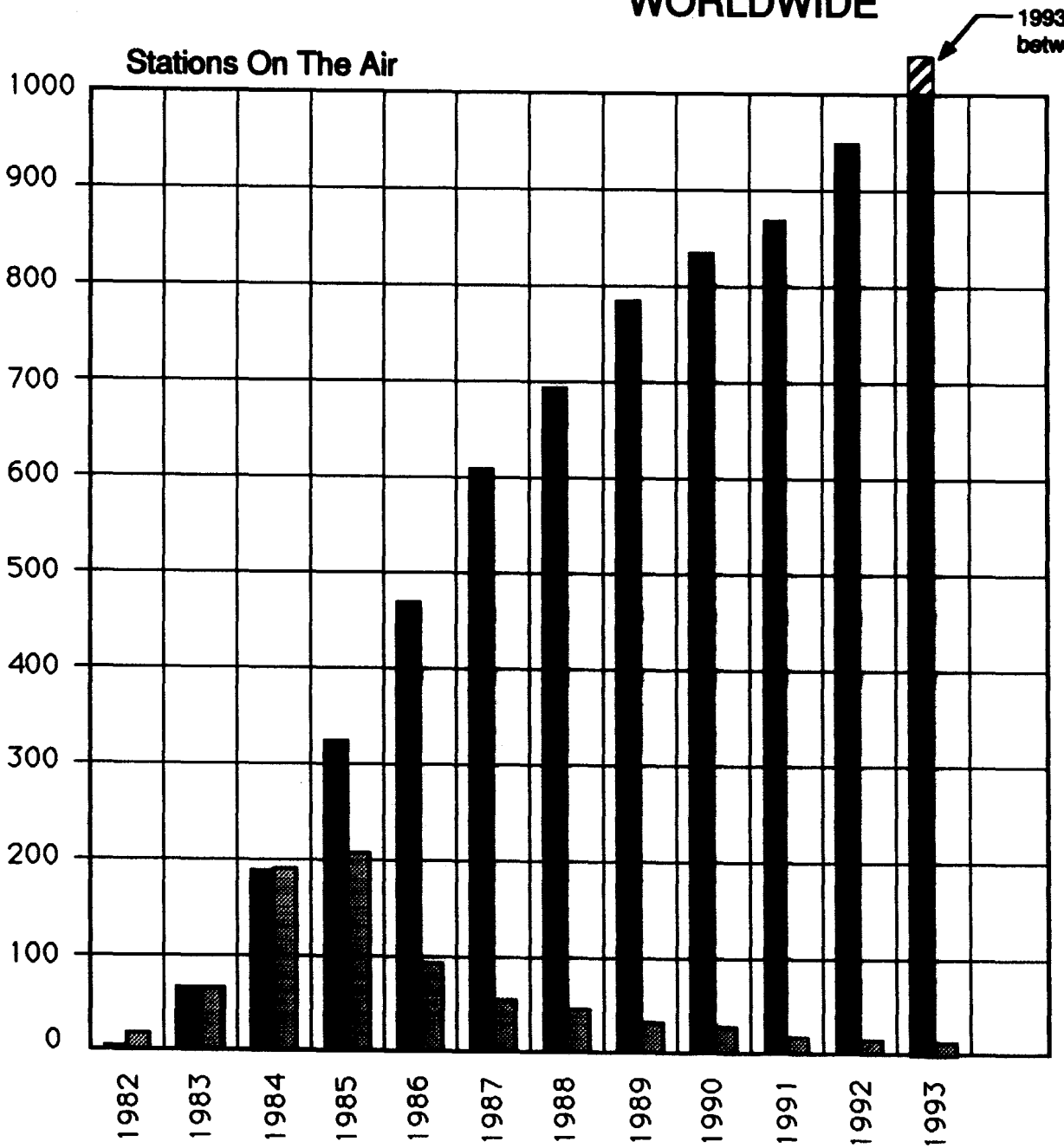
COMMERCIAL AM STEREO STATION PROGRESSION
UNITED STATES



NOTE 1: C-QUAM plot captures C-QUAM pilot compatible Harris stations as of 1986.

NOTE 2: As of the end of March, 1993, Motorola estimates 700 stations either operating in C-Quam or in the process of conversion to C-Quam.

COMMERCIAL AM STEREO STATION PROGRESSION
WORLDWIDE



C-QUAM SYSTEM

OTHER SYSTEMS

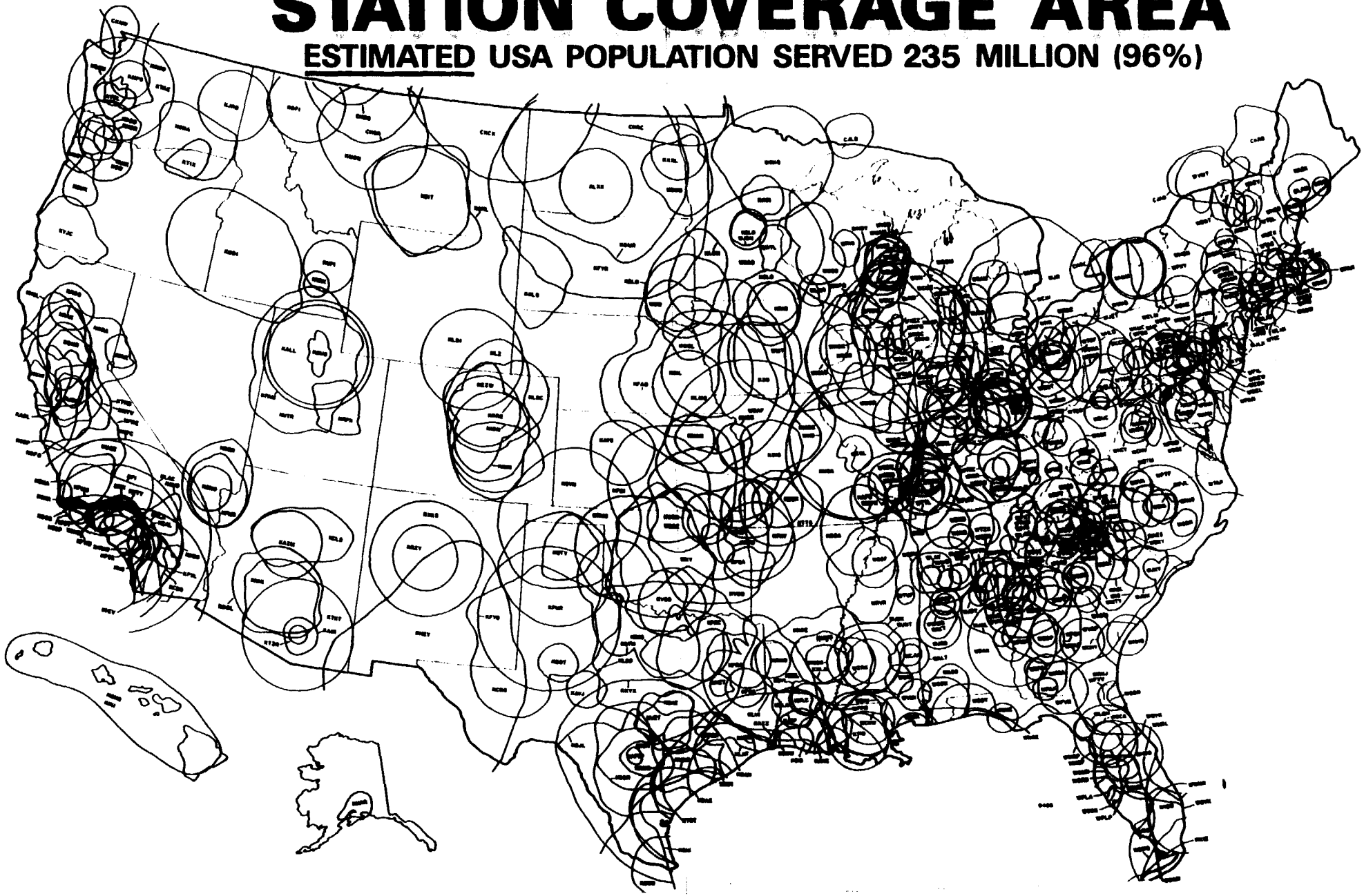
RANGE AS GOOD AS CAN BE PROJECTED

NOTE 1: C-QUAM plot captures C-QUAM pilot compatible Harris stations as of 1986.

NOTE 2: As of the end of March, 1993, Motorola estimates over 1000 stations either operating in C-Quam or in the process of conversion to C-Quam.

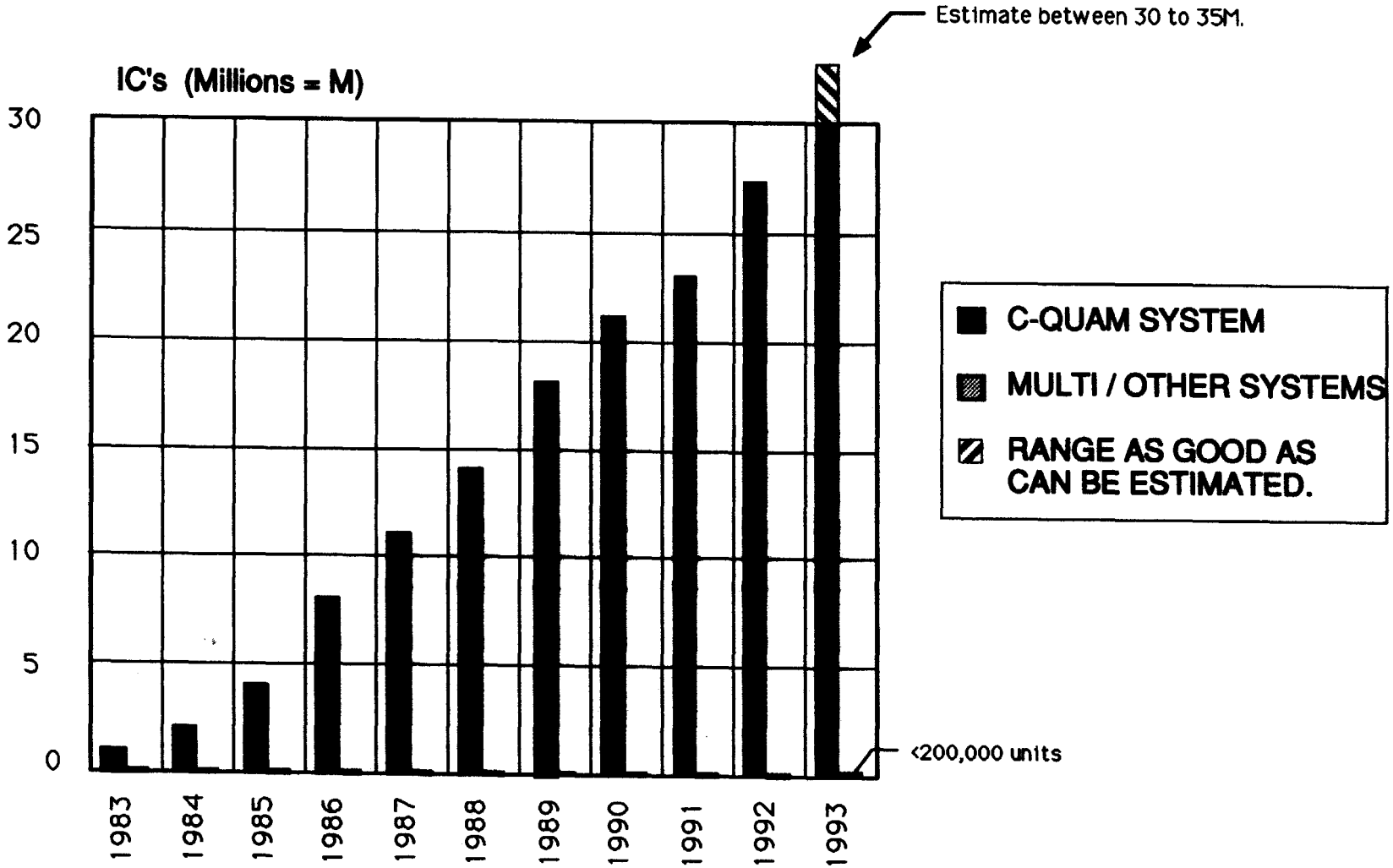
C-QUAM® AM STEREO STATION COVERAGE AREA

ESTIMATED USA POPULATION SERVED 235 MILLION (96%)



NOTE: ABOVE COVERAGE ESTIMATES HAVE NOT BEEN UPDATED SINCE 1989. THERE ARE OVER 100 ADDITIONAL U.S. STATIONS ON THE AIR SINCE.

ESTIMATES OF AM STEREO DECODER IC'S SHIPPED
WORLDWIDE



NOTE 1: Graph indicates steady receiver growth.
NOTE 2: Non-C-QUAM receivers, no longer manufactured, are less than 1% of all AM Stereo receivers currently in the marketplace.
NOTE 3: Figures are best estimates. It should be noted that some portion of the 1992 quantity and over half of the 1993 are Japan consumption.

STANDARDS STATUS SUMMARY

U.S. -- DE FACTO STANDARD (~700 STATIONS). Recently proposed for standard.

JAPAN -- C-QUAM STANDARD (Est 14)

REGION 1:

- C-QUAM STANDARD IN SOUTH AFRICA. (4)
- SPAIN (1)
- PORTUGAL (1)
- TEST PROCEEDINGS/EQUIPMENT IN U.K. AND FRANCE

REGION 2:

- C-QUAM STANDARD IN CANADA (EST 92), MEXICO (EST 29), AND BRAZIL (EST 20).
- ARGENTINA (1)
- DOMINICAN REPUBLIC (1)
- CHILE (3)
- COLUMBIA (1)
- EL SALVADOR (1)
- EQUADOR (1)
- GUATAMALA (2)
- PANAMA (1)
- VENEZUELA (8)

REGION 3:

- C-QUAM STANDARD IN AUSTRALIA (83).
- THAILAND (16)
- TAIWAN (4).
- HONG KONG (2)
- PRC (1)
- PHILIPPINES (1)
- NEW ZEALAND (1)
- EQUIPMENT SHIPPED TO INDONESIA (1)

TRANSMITTER TYPES OPERATING WITH THE MOTOROLA C-QUAM AM STEREO SYSTEM WORLDWIDE

Manufacturer	Model No.
AEL	50 kW
AWA (Australia)	BTM - 2
AWA (Australia)	BTM - 10
AWA (Australia)	BTM - 10K
Bauer	707
Bauer	FB 5000 J
Brown Bovari	100 kW
Certac	701B
Collins	20V2
Collins	20V3
Collins	21 E
Collins	21 M
Collins	820 D1
Collins	820 D2
Collins	820 E
Collins	820 E-1
Collins	820 E/F
Collins	820 F-1
Collins	828 C-1
Collins	828 E
Collins	828 E-1
Continental	314R-1
Continental	315F
Continental	315R-1
Continental	316F
Continental	317C
Continental	317C-1
Continental	317C-2
Continental	318
Continental	318.5
CCA	AM10000D
CCA	AM1000D
CCA	AM5000D
CSI	(1 kW)
CSI	T-10
CSI	T-25-A1
Elcom/Bauer	705C
Gates	BC-1F
Gates	BC-1G
Gates	BC-1H
Gates	BC-5B
Gates	BC-5H
Gates	BC-5P
Gates	BC-5T
Gates	BC-5P2
Gates	BC-10H
Gates	BC-10P
Gates	BCH-1H1
Gates	Vanguard 2
Gates Line	1 kW
Gates Line	2.5 kW
Gates Line	5 kW
General Electric	BT50A1
General Electric	BTA-50A
General Electric	BTC-50C3

Manufacturer	Model No.
Harris	MW1
Harris	MW1A
Harris	MW5
Harris	MW5A
Harris	MW5B
Harris	MW10
Harris	MW10A
Harris	MW10B
Harris	MW50
Harris	MW50A
Harris	MWD-10
Harris	SX-1
Harris	SX-2.5
Harris	SX5
Harris	DX-10
Harris	DX-50
Harris	DX-100
ITA	1000A
McMartin	BA-10K
McMartin	BA-2.5K
Nautel	P-400
Nautel	Ampfet 1
Nautel	Ampfet 2.5
Nautel	Ampfet 5
Nautel	Ampfet 10
Nautel	ND 1
Nautel	ND 2.5
Nautel	ND 5
Nautel	ND 10
Nautel	ND 50
NEC	50 / 100 kW
Raytheon	RA-1000
RCA	BTA-1000
RCA	BTA-1R1
RCA	BTA-1S
RCA	BTA-5H
RCA	BTA-5L
RCA	BTA-5L2
RCA	BTA-5R1
RCA	BTA-5SS
RCA	BTA-5T
RCA	BTA-5T1
RCA	BTA-5U
RCA	BTA-10H
RCA	BTA-10U
RCA	BTA-10U2
RCA	BTA-50J
Sparta	705C
STC	105C
STC	4-SU119A
STC	4-SU55BS
STC	4-SU55E
TBC	AEL-AM5
Telefunkin	
Toshiba	100 kW

NOTE: 110 DIFFERENT MODELS

"EDITORIAL CORRECTIONS"

The following suggested revisions to the proposed rules are of a proofreading nature only. They do not propose substantive revisions to the rules as proposed in the Commission's NPRM.

(1) Proposed Rule Section 73.128 AM Stereophonic Broadcasting. subsection (c)(3):

A "plus" sign appears in one formula, where a "minus" sign instead is appropriate. The final line of subsection (c) (3) should read as follows:

$$m_{peak}(L(t) - R(t)) = 1 \qquad \text{for 100\% phase modulation}$$

(2) Proposed Rule Section 73.128 AM Stereophonic Broadcasting. subsection (c)(8):

A minus sign was apparently inadvertently inserted into the formula for the composite signal. This minus sign appears within the cosine function, immediately at the beginning of the bracketed function, and to the left of the omega character. If this minus sign is removed, all other aspects of the formula are correct.

(3) Proposed Rule Section 72.128 AM Stereophonic Broadcasting. subsection (c)(8):

The last line uses the term "efficients," which we believe was intended to be "coefficients."

CERTIFICATE OF SERVICE

I, Alice M. de Séve, of Motorola Inc., do hereby certify that on this 5th day of April, 1993 a copy of the foregoing "Comments" was sent to each of the following by first-class mail, postage-prepaid except where service by hand is indicated(*):

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